



MRPHIP

PROSTATE HEALTH IMPROVEMENT PROGRAM

Mr PHIP No. 2

Interpreting the PSA test for prostate cancer

Key points

- > The PSA test is used as a guide to estimate the risk that cancer is present or is likely to develop in the future. It is not always accurate when used in this way and many men with high PSA levels do not have cancer.
- > PSA is of particular use after prostate cancer diagnosis, when it can be an indicator of how far the cancer has grown (stage) and for monitoring the success of treatment.
- > PSA is also used together with other clinical measures such as tumour grade (Gleason score) to assess the risk posed by a particular cancer, and so the type of treatments that might be needed and their likely outcome.

PSA: What is it and what causes it to rise?

Prostate specific antigen (PSA) is a protein in men that is secreted into ejaculate fluid by the healthy prostate. One of its functions is to aid sperm movement. Normally, only very low levels of PSA are able to enter the bloodstream. However, several conditions of the prostate can cause the PSA levels in the blood to rise. These include benign prostate enlargement, infection of the prostate and prostate cancer.

Benign enlargement of the prostate due to a condition called benign prostatic hyperplasia (BPH) occurs in older men and often causes urinary symptoms such as slow urine flow

or stopping and starting urination. Because there are more prostate cells to produce PSA, the levels rise and this increases with age. For this reason, age-based thresholds (Table 1) can be used to decide if a test result is abnormal. The percentage free to total PSA ratio (described below) also helps to show whether raised PSA is due to benign enlargement. Benign enlargement does not 'turn into' prostate cancer.

A temporary rise in the PSA can be caused by a number of conditions: urinary infection, prostatitis (inflammation of the prostate) or a biopsy of the prostate. They can cause large rises. Small rises can be caused by ejaculation and even bicycle riding. Because of these non-cancer causes of PSA rises, it is not surprising that if you have an abnormally high test result, it is not always due to prostate cancer. The chance that you have prostate cancer given an abnormal PSA result is only about 1 in 3. If, in addition to the PSA test, you have a digital rectal examination, and it also is abnormal, your chances of having prostate cancer are greater (1 in 2).

PSA and the risk of having prostate cancer

PSA is the best indicator we have so far of your risk of having prostate cancer. Prostate cancer disrupts the normal tissue structure, so more PSA leaks into the bloodstream and levels rise. The higher the PSA, the greater the chance of prostate cancer.

The median is the point where 50% men have a higher and 50% have



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Table 1: PSA range (ng/mL)

Age (years)	50th percentile (median)	95th percentile
40–49	0.65	2.0
50–59	0.85	3.0
60–69	1.39	4.0
70–79	1.64	5.5

a lower PSA (Table 1). The 95th percentile is the point at which only 5% are higher and some doctors will investigate further for PSAs over this level. However there is no single level above which you definitely have cancer and below which you don't.

Men with small prostates will be at the lower end of the PSA range. Also, men who have had a trans-urethral resection of the prostate (TURP) for urinary symptoms will have had quite a bit (although not all) of their prostate tissue removed. A 'normal' PSA for them will be at the low end of the range.

The first step, if you have a high PSA, is to rule out other causes with other tests. One of these is called the 'free to total' PSA. Much of the PSA in the blood is bound to protein, including that produced by cancer cells. But men with benign prostate enlargement have higher levels of free (unbound) PSA and so a higher free to total ratio. If the total PSA level is abnormal, the free to total PSA ratio will give an idea of whether the rise is due to benign disease or cancer. Cancer is more likely if the free to total percentage is below 10%². This test is widely used throughout Australia.

The rate of change of PSA or PSA velocity is also used by some doctors to indicate a greater risk of prostate cancer. The higher the velocity, the greater the chance it is caused by cancer. A PSA velocity of 0.75 ng/mL/yr or more for a man with PSA at or above 4 is thought of as suspicious for cancer¹. However others suggest it is not more helpful than total PSA².

PSA and risk of developing prostate cancer in the future

PSA can be used to indicate your risk of having prostate cancer at some time in the future. Studies have shown that a PSA in men 44–50 years old predicts a diagnosis of prostate cancer up to 25 years later³. For men aged 50–70 years, a PSA of greater than 1.5 ng/mL may indicate a higher than average risk of developing prostate cancer in the future⁴, and so be a guide to the need for regular PSA testing. One study⁵ suggests that a single PSA at the age of 60 years can predict the risk of a metastatic prostate cancer over a man's lifetime. This is a developing area and there are no firm guidelines as yet.

PSA after a diagnosis of prostate cancer

If cancer is present, the level of PSA in the blood rises as the tumour grows. PSA can be particularly useful after a diagnosis as a guide to how far the cancer has grown. This is called staging.

Lower levels of PSA are found in association with small tumours that may be still confined to the prostate gland (localised). PSA levels of 10 ng/mL or less have the best chance of being localised. The PSA level and the cancerous characteristics of the tumour cells themselves (called grade or Gleason score) can indicate the risk that a tumour has grown beyond the prostate. This is important because curative treatment is most successful if the cancer is confined to the prostate.



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PSA after treatment for prostate cancer

After treatment, the PSA level is an indicator of whether cancer cells remain. After surgery, PSA usually quickly drops to an undetectable level. After radiotherapy it declines more slowly as the cells gradually die. An increasing PSA suggests that some living prostate cells remain. The rate at which the PSA level increases can be an indicator of how successful the treatment was⁶.

How fast do cancers grow?

Most (but not all) prostate cancers grow slowly. It can take 5–10 years after the PSA rises above 2.5 ng/mL for it to 'appear clinically', that is, cause symptoms. The median survival time (period for which 50% of men survive with treatment) after the PSA starts to rise is reported to be 17 years⁷. For this reason, a PSA that starts to rise in an older man, say 75–80 years, is usually not considered to be a threat to his health. In a man just over 50, however, it is significant. These figures are presented as a guide only – the outlook for anyone diagnosed with prostate cancer depends on many clinical factors such as the tumour grade, the stage of the disease and other illnesses he may have.

Sources

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For more information

Mr PHIP Series available online at www.prostatehealth.org.au

1. Prostate cancer: Should I be tested?
2. Interpreting the PSA test for prostate cancer
3. After a diagnosis of prostate cancer: Choosing a treatment for localised prostate cancer
4. Life after treatment for localised prostate cancer
5. Hormone treatment for prostate cancer
6. Sexual function after treatment for prostate cancer
7. Useful resources / Glossary



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Phone

National Cancer Helpline: 13 11 20

More resources

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Disclaimer

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About Mr PHIP

This information has been developed by the Urology Unit at the Repatriation General Hospital, in consultation with urologists, men who live with prostate cancer, their families and friends. In addition other health professionals and community agencies have contributed to their production. We are grateful to all of these individuals and organisations who have been so generous with their time and willingness to assist.